

Evaluating the Role of Solar Power Expansion in India's Economic Growth

Edula Pavan Kumar

Postgraduate Student, Department of Economics, Central University of Andhra Pradesh, India

Dr. Raju Chelle

Assistant Professor, Department of Economics, Central University of Andhra Pradesh, India

Abstract

India's solar energy sector has experienced rapid growth in recent times, with the installed capacity for generating electricity through solar energy growing from a meager 161 MW in 2010 to a whopping 90 GW in 2025. This rapid growth in the solar sector is likely to influence the overall GDP growth in the country. Although several studies have been conducted on the environmental benefits of solar energy, limited research has been conducted on the macroeconomic benefits of solar energy. Specifically, the causal relationship between the expansion of solar energy and the growth of the Indian economy has not been studied.

In the juncture, the study aims to determine whether solar capacity expansion has a measurable and positive effect on GDP, and to identify sectoral linkages such as construction, manufacturing, and rural electrification. Secondary data will be drawn from government and international agencies including the Ministry of New and Renewable Energy, the Central Electricity Authority, the Reserve Bank of India, the World Bank, and the International Energy Agency. Key indicators will include installed solar capacity, generation levels, investment flows, carbon intensity, employment in the solar sector, and macroeconomic variables such as GDP growth, trade openness, inflation, and energy consumption. Time series econometric methods will be applied, including stationarity tests (ADF, PP), Johansen cointegration, Vector Error Correction Models (VECM), Granger causality, and OLS regression with robust errors.

Expected findings will highlight solar energy as both an environmental necessity and an economic growth driver. Policy implications include strengthening domestic solar manufacturing under the PLI scheme, expanding green finance, and aligning state level renewable additions with national growth targets. This research will contribute to understanding how solar energy supports India's ambition of becoming a \$5 trillion economy.

Keywords

Solar Energy, GDP Growth, Cointegration, Renewable Energy Policy, Energy Growth Nexus.